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LEE, DAVID J	
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/004,095	ISLAM, MOHAMMED N.	
	Examiner	Art Unit	
	David Lee	2613	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 April 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,15-17,23-34,37-71,73-77,85 and 89-116* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,15-17,23-30,32-34,37-71,73-77,85 and 89-116* is/are rejected.

7)☒ Claim(s) *31* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03 December 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 58-63, 109 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claims contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claim 58 recites the limitation, in part, "each filter associated with an output link from the communication system and operable to separate the multiple wavelength signal into a plurality of output wavelength signals." The specification does not disclose a filter operable to separate a multiple wavelength signal into a plurality of output wavelength signals. Rather, it teaches a demultiplexer operable to separate a multiple wavelength signal into a plurality of output wavelength signals and a filter operable to filter desired frequencies.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 23, 58-63, 85, 109 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 23 recites the limitation in part, "by tuning multiple of the filters to the same selected wavelength." The limitation "the same selected wavelength" lacks sufficient antecedent basis for this limitation in the claim. Furthermore, it is not understood what is meant by "tuning multiple of the filters." Grammatical or contextual correction is required.

Claim 58 recites the limitation, in part, "each filter associated with an output link from the communication system and operable to separate the multiple wavelength signal into a plurality of output wavelength signals." Where applicant acts as his or her own lexicographer to specifically define a term of a claim contrary to its ordinary meaning, the written description must clearly redefine the claim term and set forth the uncommon definition so as to put one reasonably skilled in the art on notice that the applicant intended to so redefine that claim term. *Process Control Corp. v. HydReclaim Corp.*, 190 F.3d 1350, 1357, 52 USPQ2d 1029, 1033 (Fed. Cir. 1999). The term "filter" in claim 58 is used by the claim to mean "separate[ing] the multiple wavelength signal into a plurality of output wavelength signals", while the accepted meaning is "filtering/blocking certain frequencies." The term is indefinite because the specification does not clearly redefine the term.

Claim 85 recites the limitation "the selected filter". There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 17, 43, 45, 49, 71, 92, 96, 97, 103, 105, 108, 116 are rejected under 35 U.S.C. 102(b) as being anticipated by Steensma et al. (US Patent No. 4,450,554).

Regarding claims 1, 43, 49, 71, Steensma teaches a communication system comprising: one or more line cards (e.g., components on the upper right, connected to and including transmitter 3 and receiver 5 of fig. 1) each operable to receive at least one packet comprising an identifier associated with at least one of a plurality of destination elements (packet is received from voice user through packetizer 2 of fig. 1), each line card comprising control circuitry operable to generate a control signal comprising control information (via microcomputer 8 of fig. 1); one or more optical transmitters each associated with one of the one or more line cards and operable to generate at a specified wavelength an optical signal comprising at least a portion of the at least one packet received by the line card associated with that optical transmitter (transmitter 3 of fig. 1), the optical signal further comprising at least a portion of the control information of the control signal generated by the control circuitry of the line card associated with that optical transmitter (the optical signal includes control information from microcomputer 8, including header/address information; see also col. 3, lines 35-45); and a receiver associated with one of the one or more line cards and operable to receive an upstream optical signal from the plurality of destination elements (receiver 5 of fig. 1); a star communicating fabric (star coupler 4 of fig. 1) operable to receive the optical signals from one or more optical transmitters and to communicate to each of the plurality of destination elements a substantially similar set of at least some of the optical signals (star coupler 4 of fig. 1; note that a similar set of signals received by the fabric are transmitted to each of the plurality of destination elements – see col. 6,

lines 3-12), wherein the at least a portion of the control information of the optical signal is communicated to each of the plurality of destination elements through the star communicating fabric in a same direction as the optical signals (the control signals are transmitted with the signal in the form of a header - see, e.g., col. 3, lines 45-60); wherein each of the plurality of destination elements comprise a filter (filters 10 or 17 of fig. 2; note that fig. 2 is a detailed illustration of the encoder and decoder 1 and 7 of fig. 1) coupled to a destination receiver (e.g., the destination receiver resides on the line card on the bottom right line card in the system of fig. 1) and a destination transmitter (e.g., the destination transmitter resides on the line card on the bottom right line card in the system of fig. 1), the destination receiver operable to receive at least a fraction of the optical signals, the destination elements operable to, based at least in part on the control information of the optical signal, perform an operation to generate the upstream optical signal that is transmitted by the destination transmitter (via voice user and packetizer to transmitter), the destination elements coupled to the star communicating fabric (destination elements are coupled to fabric 4), which communicates at least a fraction of the upstream optical signal to the receiver associated with the one of the line cards (e.g., to receiver 5 of fig. 1).

Regarding claim 17, Steensma teaches the identifier comprises an address or a tag identifying an element external to the communication system to which information in the packet is destined (e.g., to voice or data user of fig. 1; see also col. 3, lines 45-55).

Regarding claim 45, Steensma teaches that at least one of the one or more optical transmitters resides externally to its associated line card (transmitter 3 resides externally to the line card).

Regarding claims 92, 103, Steensma teaches that the transmitter is coupled to a WDM (col. 9, lines 20-22).

Regarding claim 96, Steensma discloses that the control circuitry comprises a scheduler (see fig. 10; see also col. 12, lines 18-53).

Regarding claim 97, 108, 116, Steensma discloses that the plurality of destination elements are located at different physical locations (see fig. 1).

Regarding claim 105, Steensma teaches that the destination elements are remotely located from the line card (see fig. 1).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2, 3, 25, 27, 28, 44, 50, 53, 55, 56, 73, 74, 89, 93, 102, 106, 114 are rejected under 35 U.S.C. 103(a) as being unpatentable over Steensma in view of Arthurs et al. (US Patent No. 5,005,167).

Regarding claims 2, 44, 50, 73, 74, Steensma teaches the limitations of claim 1 but does not specifically disclose that the optical transmitter is fixed. However, fixed wavelength transmitters are well known and widely used in the art. For example, Arthurs from a similar field of endeavor teaches a plurality of fixed wavelength transmitters (22-1 of fig. 1) transmitting to a star communicating fabric (20 of fig. 1) operable to receive the optical signals from one or

more optical transmitters and to communicate to each of the plurality of destination elements a substantially similar set of at least some of the optical signals (via lines 27-N of fig. 1). It would have been obvious to a skilled artisan at the time of invention to use the fixed wavelength transmitters of Arthurs in the system of Steensma in order to provide a cost-efficient and simple transmission scheme. Note that the microcomputer and the transmitter reside on the line card.

Regarding claim 3, the combined invention of Steensma and Arthurs teaches that the use of fixed wavelength optical transmitters comprises a primary mechanism for reducing collisions within the communicating fabric (col. 3, lines 4-21 of Arthurs; note also that the use of fixed wavelength transmitters functions as a mechanism for reducing collisions in that each wavelength is fixed, rather than tunable).

Regarding claims 25, 53, 93, Steensma does not expressly disclose that the star communicating fabric comprises a signal divider. However, a signal divider is a common component residing in a star communicating fabric, used to receive a signal and to divide it into the plurality of output signals. For example, Arthurs from a similar field of endeavor, teaches a star communicating fabric comprising a signal divider operable to receive a multiple wavelength signal and to communicate the multiple wavelength signal to a plurality of output paths from the star communicating fabric (21 of fig. 1: a star coupler divides the power of a combined signal, thereby replicating the combined signal to a plurality of outputs; see also col. 2, lines 54-60). A skilled artisan at the time of invention would have clearly recognized that a signal divider was used in the star communicating fabric of Steensma, or, it would have been obvious to a skilled artisan at the time of invention to include a signal divider in order to perform, in part, the

function of communicating to each of the plurality of destination elements a substantially similar set of at least some of the optical signals.

Regarding claims 27, 55, Arthurs teaches that the signal divider comprises a power divider (star couplers divide the power of a signal; see also col. 2, lines 54-60).

Regarding claims 28, 56, Steensma does not expressly disclose that the star communicating fabric comprises a signal combiner. However, a signal combiner is a common component residing in a star communicating fabric, used to receive a signal and to combine it into the plurality of output signals. For example, Arthurs teaches that the communicating fabric comprises a signal combiner operable to combine a plurality of wavelength signals into the multiple wavelength signal and to communicate the multiple wavelength signal to the signal divider (see 21 of fig. 1: star couplers combine at least 2 inputs and power splits the combined signal into at least two identical signals). A skilled artisan at the time of invention would have clearly recognized that a signal combiner was used in the star communicating fabric of Steensma, or, it would have been obvious to a skilled artisan at the time of invention to include a signal divider in order to perform, in part, the function of communicating to each of the plurality of destination elements a substantially similar set of at least some of the optical signals.

Regarding claim 89, 102, 106, 114, Steensma does not expressly disclose that the upstream signal and the specified wavelength can be different. However, Arthurs from a similar field endeavor teaches that the upstream optical signal from the plurality of destination elements is at a different wavelength than the specified wavelength (the operation of the communication system in fig. 1 is capable of having the wavelength of the upstream signal be different than the wavelength of the optical signal; e.g. – a signal from 22-1 at λ_1 can exit at 14-3 at another

wavelength). It would have been obvious to a skilled artisan at the time of invention to have the two wavelengths different in order to prevent frequency contention.

Claims 26, 54, 94, 104, 107, 115 are rejected under 35 U.S.C. 103(a) as being unpatentable over Steensma in view of Arthurs and in further view of Suchoski, Jr (US Patent No. 4,953,935).

Regarding claims 26, 54, 94, 104, 107, 115, the combined invention of Steensma and Arthurs teaches the limitations above, but does not expressly disclose that the signal divider comprises a cascade of 1xn optical couplers. However, the use of cascaded optical couplers in star topology networks is well known in the art, as illustrated by Suchoski (fig. 3). It would have been obvious to one of ordinary skill in the art at the time of invention to use cascaded optical couplers in order to divide the signal in the appropriate amount of outputs.

Claims 29, 57, 95, are rejected under 35 U.S.C. 103(a) as being unpatentable over Steensma in view of Arthurs and in further view of Bergmann (US Patent No. 5,140,655).

Regarding claims 29, 57, 95, the combined invention of Steensma and Arthurs teaches the limitations of claims 25 but does not expressly an optical amplifier operable to receive and amplify at least a fraction of the multiple wavelength signal. However, the use of amplifiers in star couplers is well known in the art. For example, Bergmann, from a similar field of endeavor, discloses an optical star coupler utilizing fiber amplifier technology (76 of fig. 6). It would have been obvious to a skilled artisan at the time of invention to amplify the signal in order to compensate for the loss caused from dividing the signal.

Claims 30, 46, 75 are rejected under 35 U.S.C. 103(a) as being unpatentable over Steensma in view of Arthurs and in further view of Knox et al. (US Patent No. 5,631,758).

Regarding claims 30, 46, 75, the combined invention of Steensma and Arthurs does not expressly disclose that at least some of the plurality of optical transmitters each comprise: a modulator operable to receive from common bay equipment an unmodulated optical signal having a center wavelength and to modulate the received signal; wherein the common bay equipment is operable to generate using a single optical source a plurality of unmodulated optical signals each having a center wavelength. However, Knox teaches a modulator (207 of fig. 2) operable to receive from common bay equipment an unmodulated optical signal (from 201 of fig. 2) having a center wavelength (fig. 1a) and to modulate the received signal; wherein the common bay equipment is operable to generate using a single optical source a plurality of unmodulated optical signals each having a center wavelength ($\lambda 1 - \lambda n$ of fig. 2; see also figs. 1a and 1b). It would have been obvious to one of ordinary skill in the art at the time of invention to incorporate in at least some of the transmitters a modulator operable to receive from common bay equipment an unmodulated optical signal having a center wavelength and to modulate the received signal wherein the common bay equipment is operable to generate using a single optical source a plurality of unmodulated optical signals each having a center wavelength in order to allow additional users to transmit data in and through the router.

Claims 4, 23, 90, 91 are rejected under 35 U.S.C. 103(a) as being unpatentable over Steensma.

Regarding claim 4, Steensma does not specifically teach that the filter is tunable. However, examiner takes official notice that tunable filters are well known in the art. It would have been obvious to a skilled artisan at the time of invention to incorporable a tuning function in the filter of Steensma in order to provide increased flexibility and versatility in signal reception.

Regarding claim 23, in view of the 112 rejection above, Steensma teaches that the communication system is operable to facilitate multicast or broadcast operation (see col. 4, lines 33-34).

Regarding claims 90 and 91, Steensma does not expressly disclose that an EDFA optical amplifier is coupled to the transmitter. Examiner takes official notice that using an optical amplifier along a transmission line is well known. It would have been obvious to a skilled artisan at the time of invention to use an EDFA amplifier along the transmission line of Steensma in order to boost signal levels.

Claims 15, 47, 51, 76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Steensma in view of Dantu et al. (US Patent No. 6,532,088).

Regarding claims 15, 47, 51, 76, Steensma teaches the limitations of claim 1 but does not expressly disclose that the packet comprises an IP or TCP packet. However, the use of the use of TCP in an optical packet switching system is well known and widely used in the art. For example, Dantu teaches an optical transmission system using packets comprising TCP/IP to transmit signals over a network (col. 1, line 66 - col. 2, line 8). A skilled artisan would have been motivated to implement TCP in a system for multiple reasons. With TCP, end-to-end virtual

connections, which set parameters for transferring data without assigning physical network channels, are established between subscribers. With this type of operation, TCP is implemented in the end stations, but not seen by the network itself. This allocation of functions simplifies processing within the network and facilitates interfacing between heterogeneous networks. Furthermore, other advantages associated with TCP include the ability to have variable size packets, less operating systems interrupts, fast routing for data calls, and error control for efficient and accurate transmission. It would have been obvious to a skilled artisan at the time of invention to implement TCP in the system of Steensma in order to take advantage of the benefits above so as to improve overall system performance.

Claims 16, 48, 52, 64, 69, 70, 77, 111, 113 are rejected under 35 U.S.C. 103(a) as being unpatentable over Steensma in view of O'Connor (US Pub. No. 2002/0085543 A1).

Regarding claims 16, 48, 52, 64, 77, Steensma teaches the limitations of claim 1 but does not expressly disclose that the packet comprises an MPLS packet. However, MPLS is an advanced routing technique well known in the art. For example, O'Connor teaches an advanced IP/SONET system wherein regular packets are converted into an MPLS format at edge nodes (paragraph 0008). A skilled artisan would have been motivated to use MPLS packets in order to reduce the amount of state information that needs to be maintained by a network, to determine the physical path through a network, to identify the quality of service requirements of paths through the network and to provide multiple paths through access networks. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to use MPLS packets as taught by O'Connor in the transmission system of Steensma.

Regarding claim 69, Steensma teaches that at least one of the filters resides externally to all of the line cards (e.g., filter 17 of fig. 2 is considered to reside externally to the line cards).

Regarding claim 70, Steensma teaches that each of the filters resides on a respective one of the one or more line cards (e.g., filter 17 of fig. 2 is considered to reside on the line card).

Regarding claims 111, Steensma teaches that the transmitter is coupled to a WDM (col. 9, lines 20-22).

Regarding claim 113, Steensma discloses that the plurality of destination elements are located at different physical locations (see fig. 1).

Claim 112 is rejected under 35 U.S.C. 103(a) as being unpatentable over Steensma in view of O'Connor and in further view of Suchoski, Jr (US Patent No. 4,953,935).

Regarding claim 112, the combined invention of Steensma and O'Connor teaches the limitations above, but does not expressly disclose that the signal divider comprises a cascade of 1xn optical couplers. However, the use of cascaded optical couplers in star topology networks is well known in the art, as illustrated by Suchoski (fig. 3). It would have been obvious to one of ordinary skill in the art at the time of invention to use cascaded optical couplers in order to divide the signal in the appropriate amount of outputs.

Claims 65, 67, 110 are rejected under 35 U.S.C. 103(a) as being unpatentable over Steensma in view of O'Connor and in further view of Arthurs et al. (US Patent No. 4,873,681; herein referred to as "Arthurs '681")

Regarding claim 65, the combined invention of Steensma and O'Connor teaches the limitations of claim 64 but does not disclose that the signals are generated by tunable optical transmitters. However the use of tunable optical transmitters is well known in the art. For example, Arthurs '681 teaches the use of tunable optical transmitters in a switching core (45-N of fig. 1). It would have been obvious to a skilled artisan at the time of invention to use a tunable transmitter in order to have more flexibility in wavelength transmission so as to increase transmission efficiency by traffic/wavelength reallocation.

Regarding claim 67, the combined invention of Steensma and O'Connor does not specifically teach a tunable optical filter. However, tunable optical filters are well known in the art. For example, Arthurs '681 from a similar endeavor teaches a tunable optical filter (51-N) selectively tuning to a particular optical signal. It would have been obvious to a skilled artisan at the time of invention to incorporate a tunable optical filter in the system of Steensma in order to provide versatility in filtering out undesired wavelengths.

Regarding claim 110, Steensma does not expressly disclose that the upstream signal and the specified wavelength can be different. However, Arthurs from a similar field endeavor teaches that the upstream optical signal from the plurality of destination elements is at a different wavelength than the specified wavelength (the operation of the communication system in fig. 1 is capable of having the wavelength of the upstream signal be different than the wavelength of the optical signal; e.g. – a signal from 22-1 at λ_1 can exit at 14-3 at another wavelength). It would have been obvious to a skilled artisan at the time of invention to have the two wavelengths different in order to prevent frequency contention.

Claim 66 is rejected under 35 U.S.C. 103(a) as being unpatentable over Steensma in view of O'Connor and in further view of Knox et al. (US Patent No. 5,631,758).

Regarding claim 66, the combined invention of Steensma and O'Connor does not expressly disclose that at least some of the plurality of optical transmitters each comprise: a modulator operable to receive from common bay equipment an unmodulated optical signal having a center wavelength and to modulate the received signal; wherein the common bay equipment is operable to generate using a single optical source a plurality of unmodulated optical signals each having a center wavelength. However, Knox teaches a modulator (207 of fig. 2) operable to receive from common bay equipment an unmodulated optical signal (from 201 of fig. 2) having a center wavelength (fig. 1a) and to modulate the received signal; wherein the common bay equipment is operable to generate using a single optical source a plurality of unmodulated optical signals each having a center wavelength ($\lambda 1 - \lambda n$ of fig. 2; see also figs. 1a and 1b). It would have been obvious to one of ordinary skill in the art at the time of invention to incorporate in at least some of the transmitters a modulator operable to receive from common bay equipment an unmodulated optical signal having a center wavelength and to modulate the received signal wherein the common bay equipment is operable to generate using a single optical source a plurality of unmodulated optical signals each having a center wavelength in order to allow additional users to transmit data in and through the router.

Claim 68 is rejected under 35 U.S.C. 103(a) as being unpatentable over Steensma in view of O'Connor and in further view of Arthurs et al. (US Patent No. 5,005,167).

Regarding claim 68, Steensma teaches the limitations of claim 64 but does not specifically disclose that the optical transmitter is fixed. However, fixed wavelength transmitters are well known and widely used in the art. For example, Arthurs from a similar field of endeavor teaches a plurality of fixed wavelength transmitters (22-1 of fig. 1) transmitting to a star communicating fabric (20 of fig. 1) operable to receive the optical signals from one or more optical transmitters and to communicate to each of the plurality of destination elements a substantially similar set of at least some of the optical signals (via lines 27-N of fig. 1). It would have been obvious to a skilled artisan at the time of invention to use the fixed wavelength transmitters of Arthurs in the system of Steensma and O'Connor in order to provide a cost-efficient and simple transmission scheme.

Claims 24, 32, 38, 40, 41, 99 are rejected under 35 U.S.C. 103(a) as being unpatentable over Steensma in view of DeSalvo et al. (US Patent No. 6,980,747 B1).

Regarding claim 32, Steensma teaches a line card for use in a communication system and operable to receive a packet comprising an identifier associated with a destination element (see fig. 1; see also col. 3, lines 45-55), the line card comprising: a control circuitry operable to facilitate generation of a control signal comprising control information based at least in part on the identifier (microcomputer 8 of fig. 1); an optical transmitter operable to generate an optical signal comprising at least a portion of the packet (transmitter 3 of fig. 1), the optical signal further comprising at least a portion of the control information of the control signal at a particular wavelength (the packet transmitted by the transmitter comprises header/control information; see also col. 3, lines 45-55), the optical transmitter further operable to communicate the optical

signal to a star communicating fabric (star coupler 4 of fig. 1); an optical receiver operable to receive an upstream optical signal (receiver 4 of fig. 1), wherein the at least a portion of the control information of the optical signal is communicated to the destination element through the star communicating fabric in a same direction as the optical signals (via star coupler 4 of fig. 1); and wherein the destination element comprises a destination receiver (e.g., receiver at bottom right line card of fig. 1) and a destination transmitter (e.g., transmitter at bottom right line card of fig. 1); the destination receiver operable to receive at least a fraction of the optical signals (via fabric 4), the destination elements operable to, based at least in part on the control information of the optical signal, perform an operation to generate the upstream optical signal that is transmitted by the destination transmitter (via destination transmitter at bottom right line card), the destination elements coupled to the star communicating fabric (fabric 4 of fig. 1), which communicates at least a fraction of the upstream optical signal to the receiver associated with the one of the line cards (receiver 5 of fig. 1). Steensma does not disclose that an optical preamplifier is coupled to the receiver associated with the one of the line cards. However, it is well known and inherent that the power of optical signals decrease as they propagate across transmission mediums. In order to compensate for this, preamplifiers are generally used to boost signal levels before optical reception. For example, DeSalvo teaches an optical communication system comprising a receiver coupled to an EDFA preamplifier (32 of fig. 2) used to boost signal levels before the signal is received by the receiver 36. It would have been obvious to a skilled artisan at the time of invention to use a preamplifier, such as the one taught by DeSalvo, to provide preamplification to the optical signal before being received by the optical receiver of Steensma in order to boost signal levels for more accurate and reliable detection. Steensma does

not specifically disclose that the destination element comprises a filter operable to receive at least a portion of the optical signals from the star communicating fabric. However, since the preamplifier of DeSalvo produces noise, a skilled artisan would have been motivated to incorporate the tunable bandpass filter of DeSalvo (34 of fig. 2) in the combined system in order to improve signal quality and increase the signal-to-noise ratio. Note that the tunable bandpass filter of DeSalvo is used specifically to filter out noise produced by the optical preamplifier (see col. 2, line 66 – col. 3, line 3). The combined invention of Steensma and DeSalvo teaches that the destination element comprises a filter (34 of fig. 2 of DeSalvo) coupled to a destination receiver and a destination transmitter (the filter is coupled to optical receiver 5 of Steensma and indirectly coupled to optical transmitter 3 of Steensma), the filter operable to receive at least a portion of the optical signals from the star communicating fabric (the filter of DeSalvo resides between the preamplifier and the star communicating fabric and receives signals from the fabric).

Regarding claim 38, the combined invention of Steensma and DeSalvo teaches a communication system comprising: a first plurality of line cards residing in a first location (see fig. 1 of Steensma: the first plurality of line cards are the two line cards residing on the left side of the star coupler); a second plurality of line cards residing in one or more other locations physically separate from the first location (see fig. 1 of Steensma: the second plurality of line cards are the two line cards residing on the right side of the star coupler), wherein each of the line cards of the first and second pluralities of line cards comprises a filter (34 of fig. 2 of DeSalvo) coupled to a receiver and an optical transmitter operable to generate at a specified wavelength an optical signal (e.g., 3 and 5 of fig. 1 of Steensma); a star communicating fabric operable to receive a plurality of optical signals from the optical transmitters and to communicate

substantially similar sets of optical signals to each of a plurality of filters (star coupler 4 of fig. 1 of Steensma; note that a similar set of signals received by the fabric are transmitted to each of the plurality of destination elements – see col. 6, lines 3-12 of Steensma; note that a preamplifier and a filter are coupled to the receivers, as indicated above), wherein each of the optical signals comprise at least a portion of at least one packet received by one of the plurality of first line cards (see col. 6, lines 3-12 of Steensma); wherein the star communicating fabric operates as an interconnect between the different locations of line cards (4 of fig. 1 of Steensma) and wherein the communication system is operable to communicate an optical signal from an optical transmitter residing in the first location to a filter residing in the one or more other locations without converting the optical signal to an electronic form between the optical transmitter and the filter (see fig. 1 of Steensma: note that an optical signal transmitted from transmitter 3 of Steensma to the bottom right line card will be all-optical); and wherein the first plurality of line cards further comprise a control circuitry operable to generate a control signal comprising control information (microcomputer 8 of fig. 1 of Steensma), and wherein the optical transmitters associated with the first plurality of line cards communicate the control information of the control signal as at least a part of the optical signal to the second plurality of line cards (address/header information is communicated along with the packet), and wherein the second plurality of line cards perform a function based at least in part on the control information of the control signal received (see, e.g., col. 1,, lines 9-30 of Steensma), wherein the at least a portion of the control information of the optical signal is communicated to each of the second plurality of line cards through the star communicating fabric in a same direction as the optical signals (the control information is transmitted in a same direction as the optical signals).

Regarding claims 40 and 41, the combined invention of Steensma and DeSalvo teaches that the filters are tunable optical filters (34 of fig. 2 of DeSalvo).

Regarding claim 99, Steensma teaches that the transmitter is coupled to a WDM (col. 9, lines 20-22).

Regarding claim 24, the combined invention of Steensma and DeSalvo teaches the limitations as applied to claims 1 and 32, including the limitation of an optical-to-electrical converter (receiver 5 of fig. 1 of Steensma).

Claims 33, 34, 39, 98 are rejected under 35 U.S.C. 103(a) as being unpatentable over Steensma in view DeSalvo and in further view of Arthurs et al. (US Patent No. 5,005,167).

Regarding claims 33 and 39, the combined invention of Steensma and DeSalvo teaches the limitations of claims 32 and 38 but does not specifically disclose that the optical transmitter is fixed. However, fixed wavelength transmitters are well known and widely used in the art. For example, Arthurs from a similar field of endeavor teaches a plurality of fixed wavelength transmitters (22-1 of fig. 1) transmitting to a star communicating fabric (20 of fig. 1) operable to receive the optical signals from one or more optical transmitters and to communicate to each of the plurality of destination elements a substantially similar set of at least some of the optical signals (via lines 27-N of fig. 1). It would have been obvious to a skilled artisan at the time of invention to use the fixed wavelength transmitters of Arthurs in the system of Steensma and DeSalvo in order to provide a cost-efficient and simple transmission scheme.

Regarding claim 34, the combined invention of Steensma and DeSalvo teaches that the optical transmitter comprises an integrated modulator (laser drive circuit of fig. 5).

Regarding claim 98, Steensma does not expressly disclose that the upstream signal and the specified wavelength can be different. However, Arthurs from a similar field endeavor teaches that the upstream optical signal from the plurality of destination elements is at a different wavelength than the specified wavelength (the operation of the communication system in fig. 1 is capable of having the wavelength of the upstream signal be different than the wavelength of the optical signal; e.g. – a signal from 22-1 at λ_1 can exit at 14-3 at another wavelength). It would have been obvious to a skilled artisan at the time of invention to have the two wavelengths different in order to prevent frequency contention.

Claims 100 and 101 are rejected under 35 U.S.C. 103(a) as being unpatentable over Steensma in view of DeSalvo and in further view of Suchoski, Jr (US Patent No. 4,953,935).

Regarding claims 100 and 101, the combined invention of Steensma and DeSalvo teaches the limitations above, but does not expressly disclose that the signal divider comprises a cascade of 1xn optical couplers. However, the use of cascaded optical couplers in star topology networks is well known in the art, as illustrated by Suchoski (fig. 3). It would have been obvious to one of ordinary skill in the art at the time of invention to use cascaded optical couplers in order to divide the signal in the appropriate amount of outputs.

Claims 37 and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Steensma in view of DeSalvo and in further view of Knox et al. (US Patent No. 5,631,758).

Regarding claims 37 abnd 42, the combined invention of Steensma and DeSalvo does not expressly disclose that at least some of the plurality of optical transmitters each comprise: a

modulator operable to receive from common bay equipment an unmodulated optical signal having a center wavelength and to modulate the received signal; wherein the common bay equipment is operable to generate using a single optical source a plurality of unmodulated optical signals each having a center wavelength. However, Knox teaches a modulator (207 of fig. 2) operable to receive from common bay equipment an unmodulated optical signal (from 201 of fig. 2) having a center wavelength (fig. 1a) and to modulate the received signal; wherein the common bay equipment is operable to generate using a single optical source a plurality of unmodulated optical signals each having a center wavelength ($\lambda 1 - \lambda n$ of fig. 2; see also figs. 1a and 1b). It would have been obvious to one of ordinary skill in the art at the time of invention to incorporate in at least some of the transmitters a modulator operable to receive from common bay equipment an unmodulated optical signal having a center wavelength and to modulate the received signal wherein the common bay equipment is operable to generate using a single optical source a plurality of unmodulated optical signals each having a center wavelength in order to allow additional users to transmit data in and through the router.

Allowable Subject Matter

4. Claim 31 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Lee whose telephone number is (571) 272-2220. The examiner can normally be reached on Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Vanderpuye can be reached on (571) 272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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SUPERVISORY PATENT EXAMINER